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⑪ Publication number:

**0 220 029 B1**

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## EUROPEAN PATENT SPECIFICATION

④⑤ Date of publication of patent specification: **17.06.92** ⑤① Int. Cl.<sup>5</sup>: **A61B 17/10**

②① Application number: **86307845.7**

②② Date of filing: **10.10.86**

⑤④ **Surgical fastener applying apparatus and cartridge.**

③③ Priority: **10.10.85 US 785992**

④③ Date of publication of application:  
**29.04.87 Bulletin 87/18**

④⑤ Publication of the grant of the patent:  
**17.06.92 Bulletin 92/25**

⑧④ Designated Contracting States:  
**AT BE CH DE ES FR GB GR IT LI LU NL SE**

⑤⑥ References cited:  
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**EP-A- 0 156 774**  
**WO-A-82/01151**  
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## Description

This invention relates to surgical fastener applying apparatus and a cartridge, and more particularly to apparatus and a cartridge for applying a plurality of surgical fasteners in a substantially longitudinal array to body tissue clamped between fastener holding and anvil parts of the apparatus.

Several types of surgical fastener applying devices have been developed for applying a plurality of surgical fasteners in a substantially longitudinal array to body tissue clamped between fastener holding and anvil parts of the apparatus. For example, Hirsch et al. U.S. patent 3,275,211 shows apparatus for applying two parallel rows of metal surgical staples to body tissue clamped between a staple holding cartridge and the anvil which clinches the staples when they are driven from the cartridge and part way through the tissue. The cartridge is replaceable and, in one embodiment, is held in place by a forked pin. The two limbs of the pin each extend across the stapler jaw gap, one on each side of the lines of staples in the cartridge, one in each of two ears which protrude from the opposite sides of the stapler head. The forked pin is adapted to serve the dual-fold functions of retaining the cartridge while also providing a flesh retaining structure preventing tissue to be fastened from extending beyond one end of the array. Green U.S. patent 4,506,671 shows a similar type of instrument in which two-part resinous fasteners are used in place of metal surgical staples. Each two-part fastener includes a fastener part and a retainer part. The fastener parts are driven part way through the tissue so that the ends of the fastener part prongs interlock with the retainer parts which are releasably retained in the anvil part of the apparatus.

As used herein, the term "fastener" is generic to metal staples, two-part resinous fasteners, and the like. Similarly, the term "fastener holding part" is generic to the structure which initially contains metal staples or the fastener parts of two-part resinous fasteners. The term "anvil" is generic to the structure which clinches metal staples or which releasably supports the retainer parts of two-part resinous fasteners.

A number of the known instruments of the type described above have structures for generally confining the tissue to be fastened between the fastener holding and anvil parts of the apparatus. For example, the apparatus shown in the above-mentioned Green patent has a cartridge in which the fastener holding and anvil parts are pivotally connected together adjacent one end of the longitudinal fastener array. Adjacent the other end of the fastener array, a pin extends from the fastener holding part into the anvil when the cartridge is closed. Accordingly, the tissue to be fastened is

generally confined between the fastener holding and anvil parts of the apparatus by the pivotal connection adjacent one end of the fastener array and by the pin adjacent the other end of the fastener array.

The above-described tissue confining structures may allow small amounts of tissue to extend beyond the ends of the staple array. In the above-mentioned Green device, for example, a small amount of tissue may remain unfastened between (1) the pivotal connection between the fastener holding and anvil parts of the cartridge, and (2) the adjacent end of the fastener array. Similarly, a small amount of tissue may remain unfastened between the other end of the fastener array and the pin which extends from the fastener holding part into the anvil. In many situations this is not a problem. In some situations, however, it may be desirable to ensure that the fastener array completely traverses the entire tissue structure. For example, this may be important in applying fasteners transversely across a large blood vessel in order to close off the vessel. If even a small portion of the transverse axis of the vessel is left unfastened, there may be unacceptable blood flow past the fastener array.

According to a first aspect of the invention, there is provided apparatus for applying to body tissue a linear array of surgical fasteners held ready for application in a holder, the apparatus comprising the holder, an anvil opposite the holder and spaced apart from the holder to permit accommodation of the tissue between the anvil and the holder, and a pusher for expelling the array of fasteners outwardly from the holder towards the anvil thereby to apply the fasteners to the tissue, the apparatus further comprising a tissue edge control member at one end at least of the linear array of fasteners, said tissue edge control member being in longitudinal alignment with and overlapping or extending into the respective end of the fastener array, thereby preventing tissue to be fastened by the array of fasteners from extending beyond said one end at least of the array.

According to a second aspect of the invention, there is provided a cartridge comprising a holder for holding a linear array of surgical fasteners ready for application, and an anvil opposite the holder and spaced apart from the holder to permit accommodation between the anvil and the holder of the bodily tissue to be fastened by expulsion of the fasteners from the holder towards the anvil through the action of a pusher on the fasteners in the holder, the cartridge being characterized by a tissue edge control member in longitudinal alignment with, and at one end at least of, the linear array of fasteners, to prevent tissue to be fastened by the array of fasteners from extending beyond

said one end at least of the array.

With the invention, the fastener array applied by such apparatus should extend completely across the tissue clamped in the apparatus. In other words, it can ensure that no part of the tissue clamped in surgical fastener applying apparatus of the type described above can remain unfastened.

Reference will now be made to the accompanying drawings, in which:

Figure 1 is a partly exploded perspective view of an illustrative embodiment of the invention;

Figure 2 is an elevational view, partly in section, of the apparatus of Figure 1 showing an early stage in the operating cycle of the apparatus.

Figures 3-5 are elevational sectional views of the distal portion of the apparatus of Figure 1 showing successive stages in the operating cycle of the apparatus.

Figure 6 is a sectional view taken along the line 6-6 in Figure 4.

Figure 7 is a sectional view taken along the line 7-7 in Figure 2.

Figure 8 is a sectional view taken along the line 8-8 in Figure 4.

Figures 9 and 10 are schematic representations of two alternative embodiments of the invention.

As shown in Figure 1, an illustrative embodiment of the invention includes a permanent and reusable actuator 20 for removably receiving and actuating a disposable fastener applying cartridge 50. Actuator 20 may be substantially identical to the actuator shown in Figures 1-13 of Green U.S. patent 4,383,634. Accordingly, actuator 20 will be described only very briefly herein. Although modified in accordance with the present invention, cartridge 50 may also be basically similar to the cartridge shown in the above-mentioned Figures of the Green '634 patent. Again, only the new aspects of cartridge 50 will be described in full detail herein.

As mentioned above, cartridge 50 is removably mountable in the distal U-shaped portion of actuator 20. With cartridge 50 in place in actuator 20 as shown in Figure 2, the assembled instrument is positioned relative to the tissue 22 to be fastened so that the anvil part 52 of the cartridge is on one side of the tissue and the fastener holding part 54 of the cartridge is on the other side of the tissue. Clamp actuator 24 is then pivoted clockwise until it is parallel to the proximal-distal axis of actuator 20. This causes clamp pusher 26 to translate in the distal direction, thereby pivoting and translating fastener holding part 54 into tissue clamping relationship with anvil part 52 as shown progressively in Figures 3 and 4. Cartridge 50 is constructed so that clamp pusher 26 first compresses leaf spring 56 against the proximal surface of fastener holding part 54 and pivots fastener holding part 54 about

pivot pin 76. As shown in Figure 3, this causes the "upper" end of fastener holding part 54 to initially move toward anvil part 52 before the "lower" end of fastener holding part 54 moves toward the anvil part. In addition, the distal end portion 74 of pin 58 extends distally from the upper end of fastener holding part 54 into anvil part 52 early in the tissue-clamping stroke of the apparatus. Accordingly, the tissue is completely enclosed in the apparatus long before full clamping pressure is applied to the tissue. This prevents any tissue from being extruded from the apparatus when full clamping pressure is subsequently applied to the tissue.

After the tissue has been enclosed in the apparatus as described above, further distal motion of clamp pusher 26 causes fastener holding part 54 to move into substantial parallelism with anvil part 52 so that tissue 22 is fully clamped between parts 52 and 54 as shown in Figure 4. Pivot pin 76 moves along slots 78 during this phase of the motion of fastener holding part 54. Tissue 22 is now fully clamped and ready to be fastened.

To fasten the tissue, actuator handle 28 is pivoted to the rear. This causes a train of fastener pusher elements 30 and 32 in actuator 20 and 60 and 62 in cartridge 50 to move in the distal direction (see Figure 5). This in turn drives all of fasteners 64 (which in the depicted embodiment are metal surgical staples) part way through tissue 22 and against anvil 52. Anvil 52 clinches the ends of the legs of staples 64 to fasten the tissue. The fastened tissue is removed from the apparatus by releasing handle 28 and pivoting clamp actuator 24 out of the instrument frame. This proximally retracts clamp pusher 26, thereby allowing fastener holding part 54 to pivot away from anvil part 52 so that tissue 22 can be removed from the apparatus. With clamp actuator 24 pivoted out of the actuator frame, clamp pusher 26 is also pivotable out of the actuator frame as shown in Figure 1 to facilitate cleaning of the instrument for reuse.

Although fasteners 64 are metal surgical staples in the depicted embodiment, it will be readily apparent to those skilled in the art that two-part resinous fasteners of the general type shown in Green U.S. patent 4,506,671 could be used instead.

As is best seen in Figures 6-8, the depicted embodiment applies fasteners 64 in three parallel rows designated rows 66a, 66b, and 66c, respectively. Outer rows 66a and 66c are somewhat longer than inner row 66b. In accordance with the present invention, to ensure that the edge 22a of tissue 22 adjacent the "lower" end of the fastener array is not beyond that end of the array, cartridge 50 includes a first tissue edge control member 68 which is aligned with inner fastener row 66b and which overlaps or extends into the fastener array

between the adjacent ends of outer fastener rows 66a and 66c. In the depicted embodiment, tissue edge control member 68 is a web or rib which projects upwardly from the portion 70 of cartridge 50 which connects fastener holding part 54 and anvil part 52. Web 68 extends parallel to the axis along which fasteners 64 are driven and spans the entire space between the opposing faces of fastener holding part 54 and anvil part 52. In order to allow fastener holding part 54 to move toward anvil part 52 to clamp the tissue, fastener holding part 54 includes a channel 72 for receiving the proximal end of web 68 as part 54 moves toward part 52. Accordingly, at all times during positioning and clamping of tissue 22 in the apparatus, the upper edge of web 68 pushes up on the lower edge 22a of tissue 22. In particular, web 68 pushes the lower edge 22a of tissue 22 up between the lowest fasteners 64 in outer fastener rows 66a and 66c, thereby ensuring that the lower edge of the tissue is not beyond the lower end of the fastener array. The fact that inner fastener row 66b is shorter than outer fastener rows 66a and 66c allows web 68 to thus overlap or project into the fastener array between longer outer fastener rows 66a and 66c.

At the other ("upper") end of the fastener array, the distal end of pin 58 acts as a second tissue edge control member 74. As in the case of web 68, member 74 is aligned with inner fastener row 66b. Prior to operation of clamp actuator 24, member 74 is proximally retracted inside fastener holding part 54 by leaf spring 56 so that it does not interfere with placement of tissue 22 in the apparatus. However, when clamp actuator 24 is operated, member 74 extends from fastener holding part 54 into anvil part 52 in response to compression of leaf spring 56. If the upper edge 22b of tissue 22 is at or near the upper end of the staple array when member 74 is thus extended (see Figure 7), member 74 pushes that edge of the tissue down between the uppermost fasteners in outer fastener rows 66a and 66c as shown in Figure 8. Once again, this operation of member 74 is possible because inner fastener row 66b is shorter than outer fastener rows 66a and 66c, thereby allowing member 74 to overlap or extend downwardly into the upper end of the fastener array between the uppermost fasteners in rows 66a and 66c. Member 74 therefore ensures that the upper edge 22b of tissue 22 does not extend beyond the upper end of the fastener array. Together, members 68 and 74 ensure that the fastener array extends completely across tissue 22 and that no portion of the tissue is left unfastened when fasteners 64 are driven.

Figure 9 shows an alternative embodiment of the invention in which fasteners 64 are applied in four parallel rows 66d, 66e, 66f, and 66g. Outer rows 66d and 66g are longer than inner rows 66e

and 66f. Tissue edge control members 80 and 82 are aligned with inner fastener rows 66e and 66f and overlap or extend into each end of the fastener array between the end fasteners in outer fastener rows 66d and 66g. Accordingly, tissue edge control members 80 and 82 prevent the edges of tissue fastened by the depicted array from extending beyond the ends of the array, thereby ensuring that the array extends completely across the tissue and that no portion of the tissue remains unfastened.

Figure 10 shows another alternative embodiment of the invention in which fasteners 64 are again applied in three parallel rows 66h, 66i, and 66j. In this embodiment, however, inner row 66i is longer than outer rows 66h and 66j. Tissue edge control members 90 and 92 are U-shaped members which partially surround the end fasteners in inner row 66i so that the parallel legs of each U-shaped member overlap or extend into the ends of the fastener array adjacent the ends of outer fastener rows 66h and 66j. Accordingly, tissue edge control members 90 and 92 prevent the edges of tissue fastened by the depicted array from extending beyond the ends of the array, thereby ensuring that the array extends completely across the tissue so that no portion of the tissue can remain unfastened.

Instead of being embodied in a disposable cartridge for use in a reusable actuator, the entire apparatus could be constructed as a disposable article such as is shown in Figures 1-8 of Green U.S. patent 4,354,628.

## Claims

1. Apparatus for applying to body tissue (22) a linear array of surgical fasteners (64) held ready for application in a holder (50), the apparatus comprising the holder (50), an anvil (52) opposite the holder and spaced apart from the holder to permit accommodation of the tissue (22) between the anvil and the holder, and a pusher (60) for expelling the array of fasteners outwardly from the holder towards the anvil thereby to apply the fasteners to the tissue, the apparatus further comprising a tissue edge control member (68,74: 80,82:90,92) at one end at least of the linear array of fasteners (64), said tissue edge control member being in longitudinal alignment with and overlapping or extending into the respective end of the fastener array, thereby preventing tissue (22) to be fastened by the array of fasteners from extending beyond said one end at least of the array.
2. Apparatus as claimed in claim 1, characterized in that the space between the holder and the

- anvil has opposed open and closed ends, with a first said tissue edge control member at the closed end and a second said tissue edge control member at the open end.
3. Apparatus as claimed in claim 2 characterized in that the first control member is a fixed web.
  4. Apparatus as claimed in claim 2 or 3, characterized in that the second control member is housed in the holder and is movable between a retracted position within the holder and a controlling position in which it extends from the holder across the space to the anvil.
  5. Apparatus as claimed in claim 4 including a recess in the anvil to receive the second control member in its controlling position.
  6. Apparatus as claimed in claim 4 or 5 characterized in that the holder applies to the second control member the force required to move the control member from the retracted to the controlling position.
  7. Apparatus as claimed in any one of the preceding claims characterized in that the tissue edge control member, or at least one of the tissue edge control members, has a line of action which lies closer to the mid-point of the array of fasteners than the adjacent end of the line of fasteners.
  8. Apparatus as claimed in claim 7 characterized in that the array of fasteners is arranged as at least three parallel rows of fasteners, that is, a pair of outer fastener rows and at least one inner row.
  9. Apparatus as claimed in claim 8 characterized in that at least one of the two outer rows extends beyond the end of the or each inner row and the line of action of the control member is at the end of the or each inner row.
  10. Apparatus as claimed in claim 8 characterized in that the outer rows terminate short of the end of the inner row, or at least one of the inner rows, and the control member has two limbs which lies one to each side of the long inner row(s) at the end of each of the outer rows.
  11. An apparatus as claimed in any one of the preceding claims wherein said control member (90,92) is U-shaped with a pair of legs facing inwardly.

12. A cartridge comprising a holder for holding a linear array of surgical fasteners (64) ready for application, and an anvil (52) opposite the holder and spaced apart from the holder to permit accommodation between the anvil and the holder of the bodily tissue to be fastened by expulsion of the fasteners from the holder towards the anvil through the action of a pusher on the fasteners in the holder, the cartridge being characterized by a tissue edge control member (68,74 : 80,82 : 90,92) in longitudinal alignment with, and at one end at least of, the linear array of fasteners, to prevent tissue to be fastened by the array of fasteners from extending beyond said one end at least of the array.
13. A cartridge as claimed in claim 12 characterized in that the space between the holder and the anvil has opposed open and closed ends, a first said tissue edge control member at the closed end and a second said tissue edge control member at the open end.
14. A cartridge as claimed in claim 12 or 13, characterized in that the array of fasteners comprises at least three parallel lines of fasteners, namely, a pair of outer lines of fasteners and at least one inner line.
15. A cartridge as claimed in claim 14, characterized in that the tissue edge control member has a line of action at an end of the inner line or lines of fasteners, and at least one of the outer lines of fasteners extends beyond the said end of the or each inner line of fasteners and beyond said line of action of the control member.
16. A cartridge as claimed in claim 14, characterized in that the control member has two limbs, each with a line of action at the end of a different one of the lines forming the outer line of fasteners, and further characterized in that at least one end of the inner line or lines of fasteners extends beyond both the corresponding ends of the outer lines of fasteners and the said lines of action of the limbs of the control member.

#### Revendications

1. Dispositif pour appliquer à un tissu pour le corps (22) une rangée linéaire d'agrafes chirurgicales (64) maintenues prêtes pour l'application dans un moyen de maintien (50), le dispositif comprenant le moyen de maintien (50), une semelle (52) opposée au moyen de main-

- tien et espacée du moyen de maintien pour permettre le logement du tissu (22) entre la semelle et le moyen de maintien, et un poussoir (60) pour expulser la rangée d'agrafes vers l'extérieur à partir du moyen de maintien vers la semelle en appliquant ainsi les agrafes au tissu, le dispositif comprenant, en outre, un élément de contrôle de bord de tissu (68,74: 80,82:90,92) à une extrémité au moins de la rangée linéaire d'agrafes (64), ledit élément de contrôle de bord de tissu étant en alignement longitudinal avec et chevauchant ou s'étendant dans l'extrémité respective de la rangée d'agrafes en empêchant ainsi le tissu (22) à fixer par la rangée d'agrafes de s'étendre au-delà de ladite extrémité au moins de la rangée.
2. Dispositif selon la revendication 1, caractérisé en ce que l'espace entre le moyen de maintien et la semelle possède des extrémités opposées ouverte et fermée, avec un premier desdits éléments de contrôle de bord de tissu à l'extrémité fermée et un second desdits éléments de contrôle de bord de tissu à l'extrémité ouverte.
  3. Dispositif selon la revendication 2, caractérisé en ce que le premier élément de contrôle est constitué par une nervure fixe.
  4. Dispositif selon la revendication 2 ou 3, caractérisé en ce que le second élément de contrôle est logé dans le moyen de maintien et peut se déplacer entre une position rétractée à l'intérieur du moyen de maintien et une position de commande dans laquelle il s'étend depuis le moyen de maintien à travers l'espace jusqu'à la semelle.
  5. Dispositif selon la revendication 4, comprenant une partie en retrait dans la semelle pour recevoir le deuxième élément de contrôle dans sa position de commande.
  6. Dispositif selon la revendication 4 ou 5, caractérisé en ce que le moyen de maintien applique au second élément de contrôle la force requise pour déplacer l'élément de contrôle de la position rétractée à la position de commande.
  7. Dispositif selon l'une des revendications précédentes, caractérisé en ce que l'élément de contrôle de bord de tissu, ou au moins l'un des éléments de contrôle de bord de tissu, possède une ligne d'action qui est plus près du centre de la rangée d'agrafes que l'extrémité adjacente de la ligne d'agrafes.
  8. Dispositif selon la revendication 7, caractérisé en ce que la rangée d'agrafes est disposée sous la forme d'au moins trois rangées parallèles d'agrafes, c'est-à-dire une paire de rangées d'agrafes externes et au moins une rangée interne.
  9. Dispositif selon la revendication 8, caractérisé en ce qu'au moins l'une des deux rangées externes s'étend au-delà de l'extrémité de la ou de chaque rangée interne et la ligne d'action de l'élément de contrôle se situe à l'extrémité de la ou de chaque rangée interne.
  10. Dispositif selon la revendication 8, caractérisé en ce que les rangées externes se terminent peu avant l'extrémité de la rangée interne, ou au moins une des rangées internes, et l'élément de contrôle possède deux membres qui s'étendent l'un de chaque côté de ou des rangées internes longues à l'extrémité de chacune des rangées externes.
  11. Dispositif selon l'une des revendications précédentes, dans lequel ledit élément de contrôle (90,92) est en forme de U avec une paire de branches tournées vers l'intérieur.
  12. Chargeur comprenant un moyen de maintien pour maintenir une rangée linéaire d'agrafes chirurgicales (64) prêtes pour l'application, et une semelle (52) opposée au moyen de maintien et espacée du moyen de maintien pour permettre le logement entre la semelle et le moyen de maintien du tissu pour le corps à fixer par expulsion des agrafes depuis le moyen de maintien vers la semelle sous l'effet de l'action d'un poussoir sur les agrafes dans le moyen de maintien, le chargeur étant caractérisé par un élément de contrôle de bord de tissu (68,74 : 80,82 : 90,92) en alignement longitudinal avec et à une extrémité au moins de la rangée linéaire d'agrafes, pour empêcher que le tissu à fixer par la rangée d'agrafes s'étende au-delà de ladite extrémité au moins de la rangée.
  13. Chargeur selon la revendication 12, caractérisé en ce que l'espace entre le moyen de maintien et la semelle possède des extrémités opposées ouverte et fermée, un premier élément de contrôle de bord de tissu à l'extrémité fermée et un second élément de contrôle de bord de tissu à l'extrémité ouverte.
  14. Chargeur selon la revendication 12 ou 13, caractérisé en ce que la rangée d'agrafes comprend au moins trois lignes d'agrafes parallèles.

les, à savoir une paire de lignes d'agrafes externes et au moins une ligne interne.

15. Chargeur selon la revendication 14, caractérisé en ce que l'élément de contrôle de bord de tissu possède une ligne d'action à une extrémité de la ou des lignes internes d'agrafes, et au moins une des lignes externes d'agrafes s'étend au-delà de ladite extrémité de la ou de chaque ligne interne d'agrafes et au-delà de ladite ligne d'action de l'élément de contrôle.

16. Chargeur selon la revendication 14, caractérisé en ce que l'élément de contrôle possède deux membres, dont chacun présente une ligne d'action à l'extrémité d'une ligne différente de lignes formant la ligne externe d'agrafes, et caractérisé en outre en ce qu'au moins une extrémité de la ou des lignes internes d'agrafes s'étend au-delà des deux extrémités correspondantes des lignes externes d'agrafes et desdites lignes d'action des membres de l'élément de contrôle.

#### Patentansprüche

1. Vorrichtung zum Anbringen einer geradlinigen Gruppierung von chirurgischen Verbindungselementen (64) an ein Körpergewebe (22), die für eine Anwendung in einer Halterung (50) bereitgehalten wird, wobei die Vorrichtung die Halterung (50), einen Amboß (52) gegenüber der Halterung und von der Halterung beabstandet, um ein Unterbringen des Gewebes (22) zwischen dem Amboß und der Halterung zu ermöglichen, und eine Stoßvorrichtung (60) zum Ausstoßen der Gruppierung von Verbindungselementen von der Halterung nach außen in Richtung des Amboßes umfaßt, wodurch die Verbindungselemente an dem Gewebe angebracht werden, wobei die Vorrichtung ferner ein Geweberandsteuerglied (68,74: 80,82:90,92) an mindestens einem Ende der geradlinigen Gruppierung von Verbindungselementen (64) umfaßt, das mit dem jeweiligen Ende der Gruppierung von Verbindungselementen in Längsrichtung fluchtet und dieses überlappt oder in dieses hineinreicht, wodurch verhindert ist, daß durch die Gruppierung von Verbindungselementen zu verbindendes Gewebe (22) über das mindestens eine Ende der Gruppierung hinausragt.

2. Vorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß der Zwischenraum zwischen der Halterung und dem Amboß gegenüberliegende offene und geschlossene Enden aufweist, mit einem er-

sten Geweberandsteuerglied an dem geschlossenen Ende und einem zweiten Geweberandsteuerglied an dem offenen Ende.

3. Vorrichtung nach Anspruch 2, dadurch gekennzeichnet, daß das erste Steuerglied ein starrer Steg ist.

4. Vorrichtung nach Anspruch 2 oder 3, dadurch gekennzeichnet, daß das zweite Steuerglied in der Halterung untergebracht ist und zwischen einer zurückgezogenen Stellung innerhalb der Halterung und einer Steuerstellung bewegbar ist, in der es sich von der Halterung über den Zwischenraum zu dem Amboß erstreckt.

5. Vorrichtung nach Anspruch 4, mit einer Aussparung in dem Amboß, um das zweite Steuerglied in seiner Steuerposition aufzunehmen.

6. Vorrichtung nach Anspruch 4 oder 5, dadurch gekennzeichnet, daß die Halterung das zweite Steuerglied mit der Kraft beaufschlagt, die benötigt wird, um das Steuerglied von der zurückgezogenen Position in die Steuerposition zu bewegen.

7. Vorrichtung nach einem der vorstehenden Ansprüche, dadurch gekennzeichnet, daß das Geweberandsteuerglied, oder zumindest eines der Geweberandsteuerglieder eine Wirkungslinie hat, die näher an dem Mittelpunkt der Gruppierung von Verbindungselementen liegt, als das benachbarte Ende der Reihe von Verbindungselementen.

8. Vorrichtung nach Anspruch 7, dadurch gekennzeichnet, daß die Gruppierung von Verbindungselementen aus mindestens drei parallelen Reihen von Verbindungselementen besteht, d.h. aus zwei äußeren Reihen von Verbindungselementen und mindestens einer inneren Reihe.

9. Vorrichtung nach Anspruch 8, dadurch gekennzeichnet, daß sich mindestens eine der beiden äußeren Reihen über das Ende der oder jeder inneren Reihe erstreckt, und daß die Wirkungslinie des Steuergliedes an dem Ende der oder jeder inneren Reihe liegt.

10. Vorrichtung nach Anspruch 8, dadurch gekennzeichnet, daß die äußeren Reihen kurz vor dem Ende der

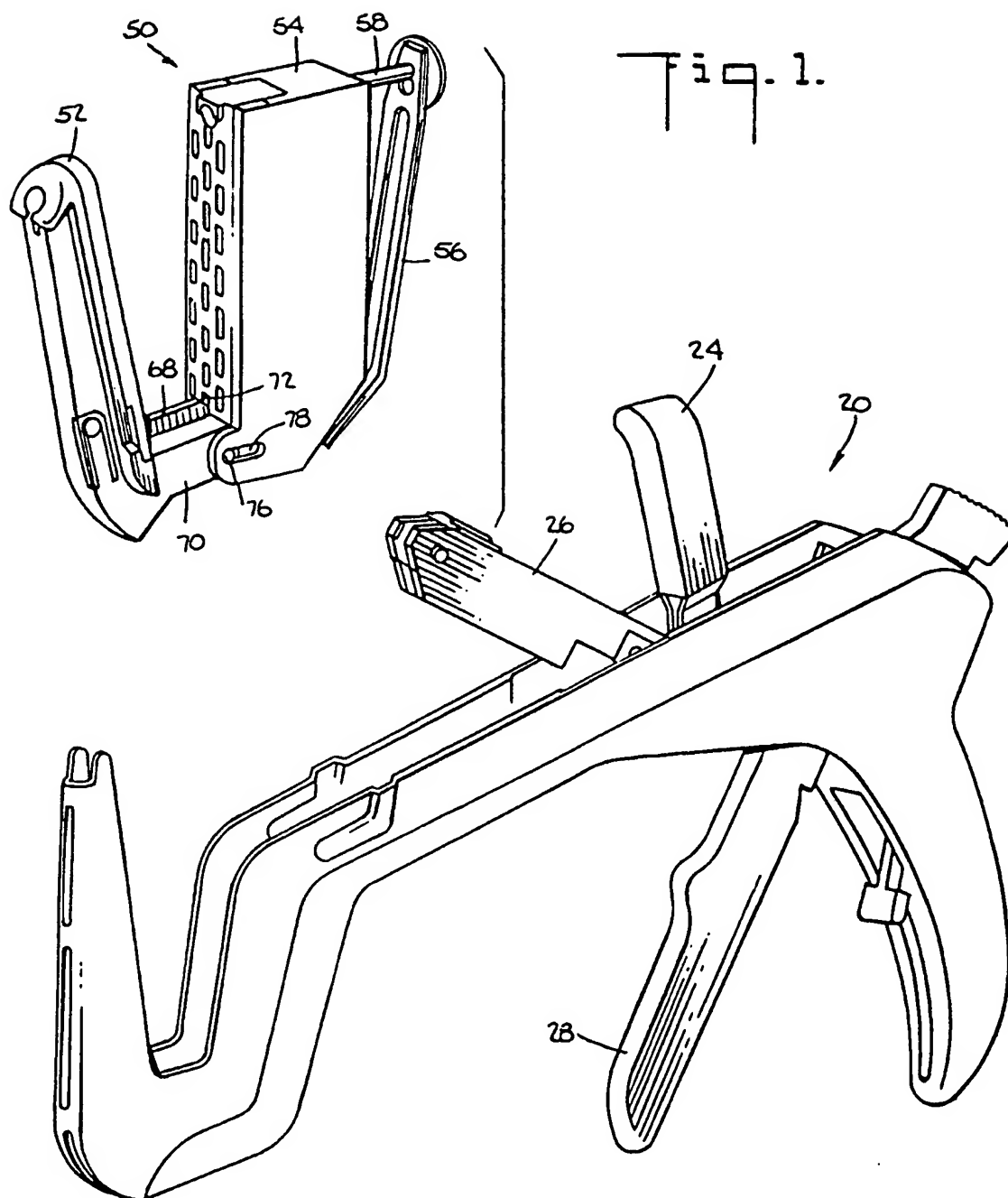
inneren Reihe oder zumindest einer der inneren Reihen enden, und daß das Steuerglied zwei Schenkel hat, von denen einer auf jeder Seite der langen inneren Reihe(n) an dem Ende jeder äußeren Reihe liegt.

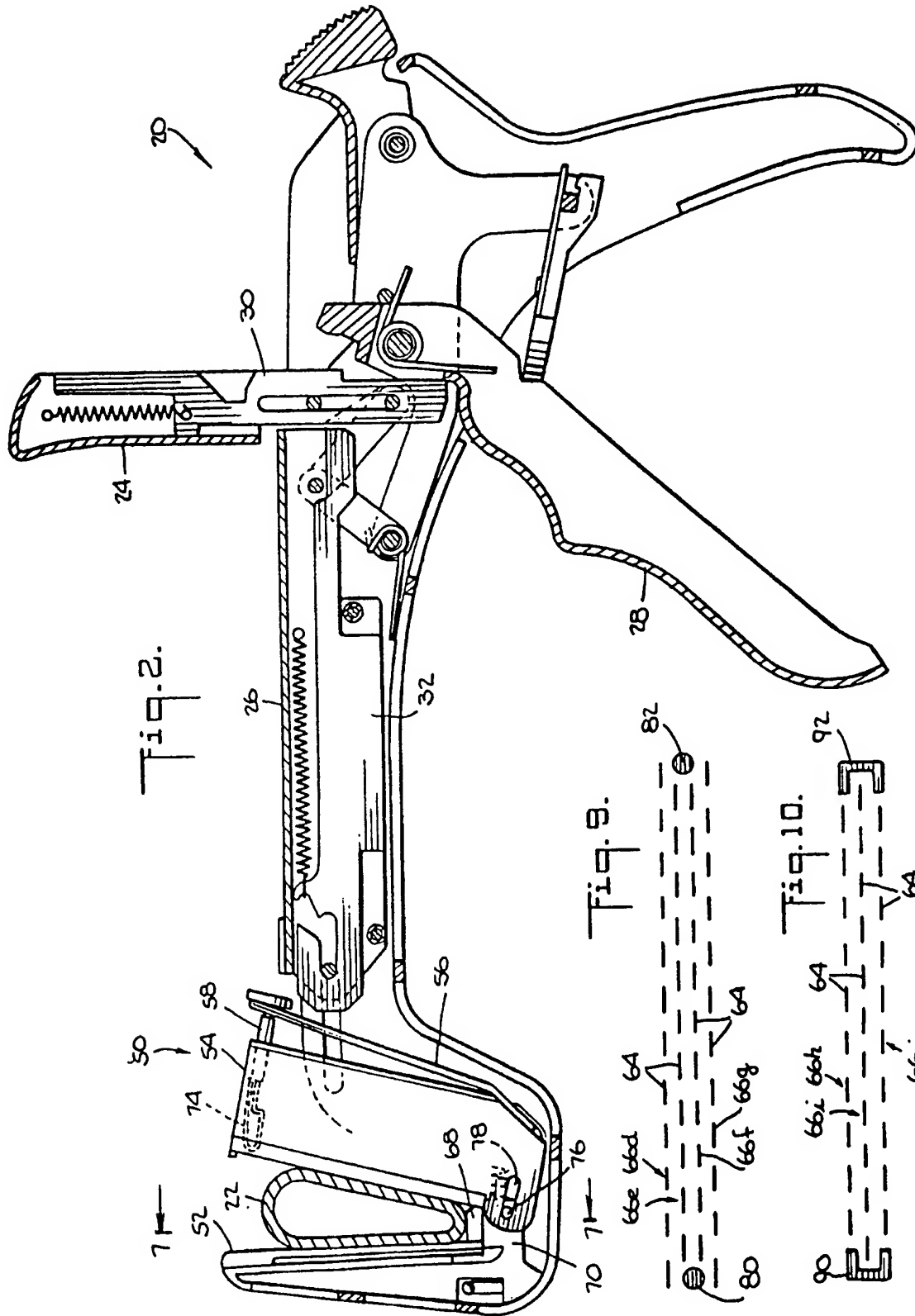
11. Vorrichtung nach einem der vorstehenden Ansprüche, dadurch **gekennzeichnet**, daß das Steuerglied (90,92) U-förmig mit zwei nach innen weisenden Schenkeln ist. 10
12. Kartusche mit einer Halterung zum Halten einer geradlinigen Gruppierung von chirurgischen Verbindungselementen (64) fertig für eine Anwendung, und mit einem Amboß (52) gegenüber der Halterung und von dieser beabstandet, um eine Unterbringung des Körpergewebes zwischen dem Amboß und der Halterung zu ermöglichen, das durch Ausstoßen der Verbindungselemente von der Halterung in Richtung des Amboßes durch die Wirkung einer Stoßvorrichtung auf die Verbindungselemente in der Halterung befestigt werden soll, dadurch **gekennzeichnet**, daß die Kartusche ein Geweberandstauerglied (68,74 : 80,82 : 90,92) aufweist, das in Längsrichtung mit der geradlinigen Gruppierung von Verbindungselementen fluchtet, und das an mindestens einem Ende der geradlinigen Gruppierung von Verbindungselementen vorgesehen ist, um zu verhindern, daß ein durch die Gruppierung von Verbindungselementen zu verbindendes Gewebe sich über das mindestens ein Ende der Gruppierung hinaus erstreckt. 15 20 25 30 35
13. Kartusche nach Anspruch 12, dadurch **gekennzeichnet**, daß der Zwischenraum zwischen der Halterung und dem Amboß gegenüberliegende offene und geschlossene Enden aufweist, mit einem ersten Geweberandstauerglied an dem geschlossenen Ende und einem zweiten Geweberandstauerglied an dem offenen Ende. 40 45
14. Kartusche nach Anspruch 12 oder 13, dadurch **gekennzeichnet**, daß die Gruppierung von Verbindungselementen mindestens drei parallele Reihen von Verbindungselementen umfaßt, nämlich zwei äußere Reihen von Verbindungselementen und mindestens eine innere Reihe. 50
15. Kartusche nach Anspruch 14, dadurch **gekennzeichnet**, daß das Geweberandstauerglied eine Wirkungslinie an einem Ende der inneren Reihe oder der 55

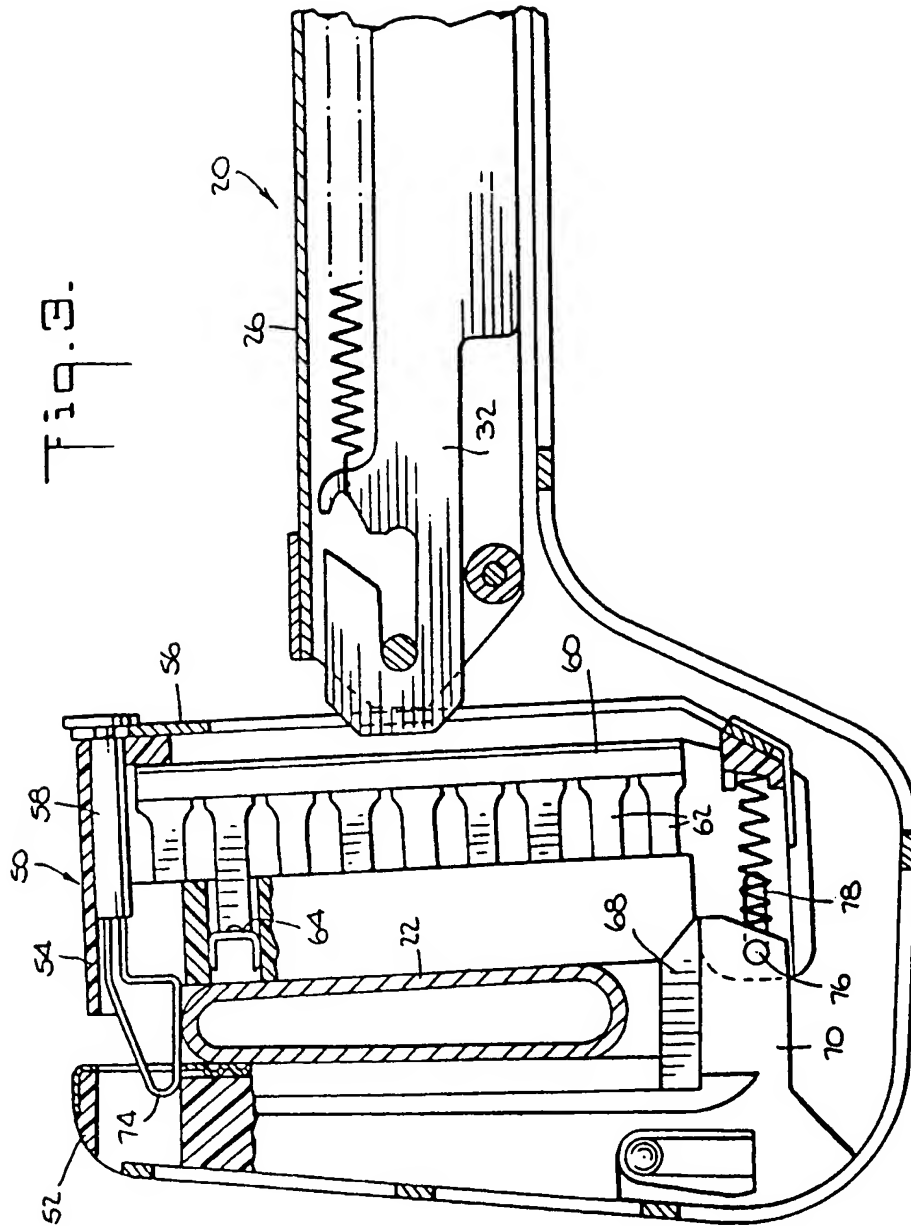
Reihen von Verbindungselementen hat, und daß mindestens eine der äußeren Reihen von Verbindungselementen sich über das eine Ende der oder jeder inneren Reihe von Verbindungselementen und über die Wirkungslinie des Steuergliedes hinaus erstreckt.

16. Kartusche nach Anspruch 14, dadurch **gekennzeichnet**, daß das Steuerglied zwei Schenkel hat, von denen jeder eine Wirkungslinie an dem Ende einer unterschiedlichen Reihe hat, welche die äußere Reihe von Verbindungselementen bilden, und daß ferner mindestens ein Ende der inneren Reihe oder der Reihen von Verbindungselementen sich sowohl über die entsprechenden Enden der äußeren Reihen von Verbindungselementen wie auch über die Wirkungslinien der Schenkel des Steuergliedes hinaus erstreckt.









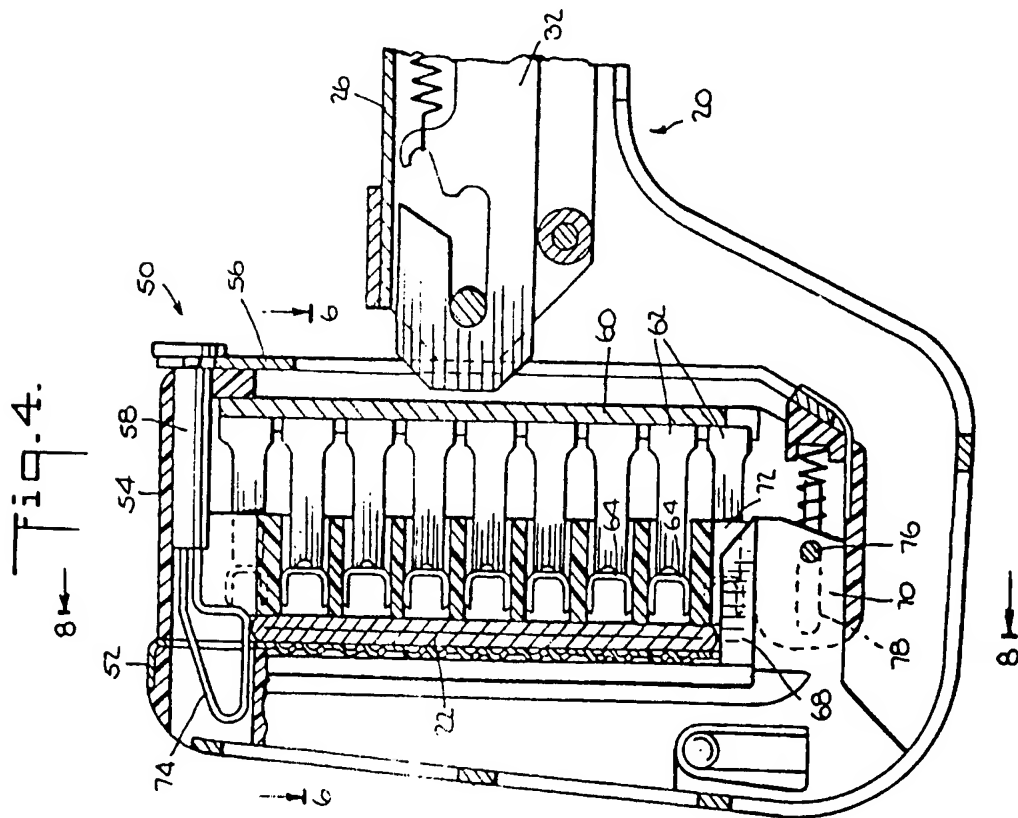
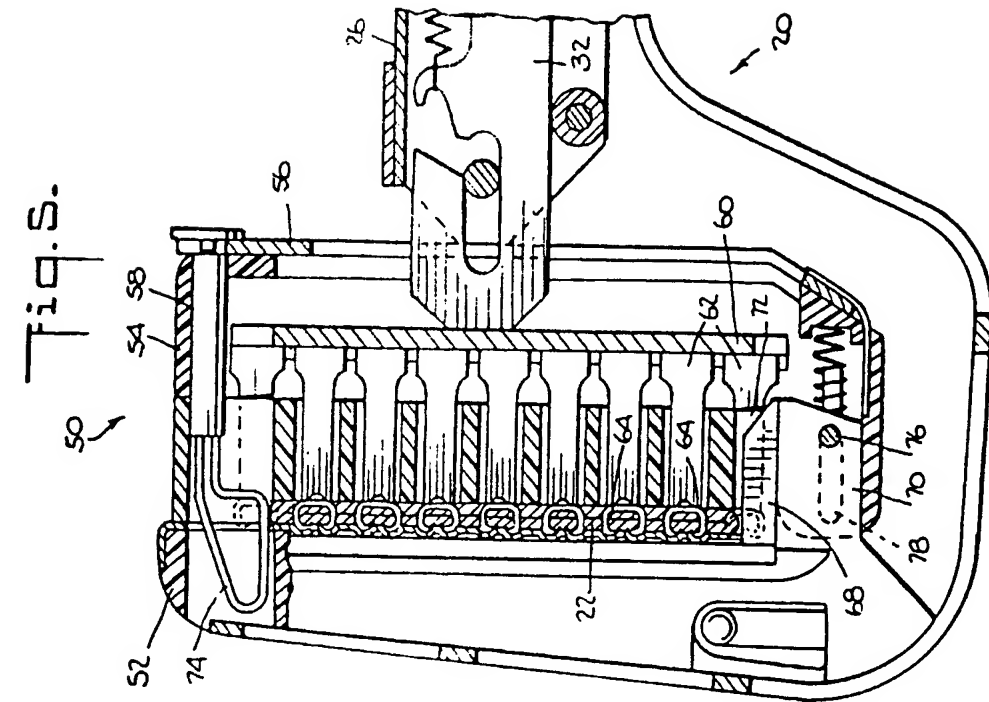


Fig. 7.

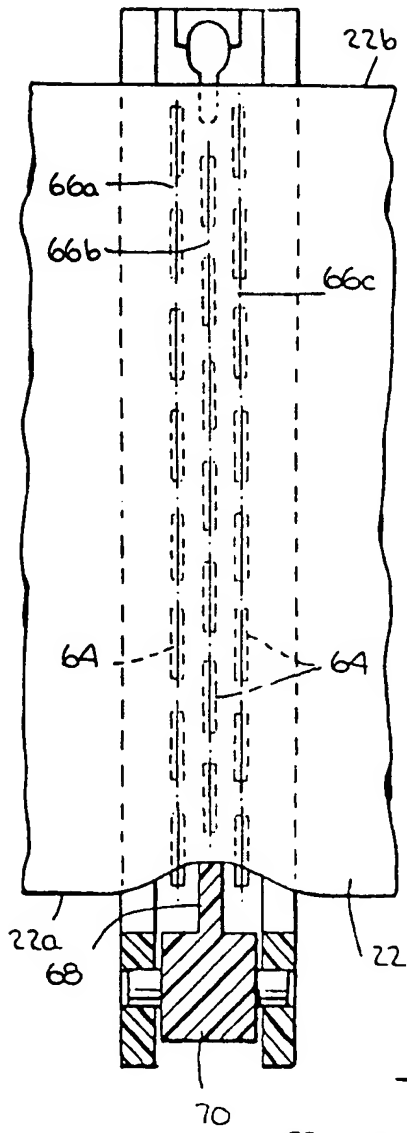


Fig. 8.

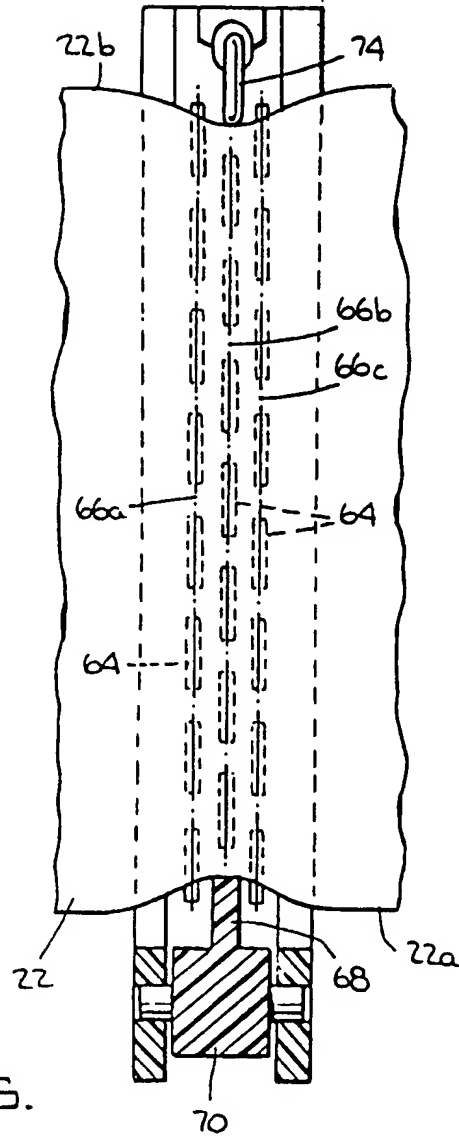
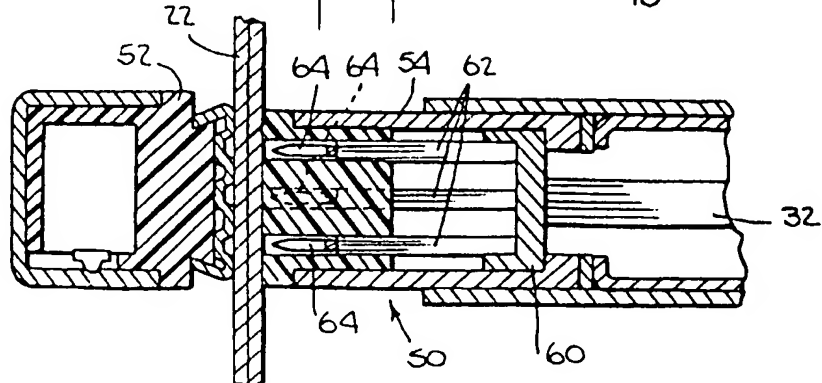


Fig. 6.



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